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### Research on Safety Supervision Model of Shanxi Group Coal Enterprises

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#### Abstract

After integration of coal resources and corporate mergers and acquisitions, Shanxi Province constantly adjusted and explored supervision system for large group coal enterprises, for the purpose of playing all levels of governments on safety supervision of coal enterprises and making Shanxi coal mine safe. Native supervision model of Henan and direct supervision model of Shanxi were made comparison from 3 aspects, supervision ability, supervision mode and supervision tasks. The supervision cases of Poly Energy Group, and China Coal Energy Company were proved that native supervision could take advantage of all coal sectors, which is to take daily supervision mainly and security supervision as a sufficient complement. Native supervision needs to be improved to establish feedback mechanisms in order to play the advantages of two comprehensive supervision modes.

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*Keywords:* Shanxi province, Coal enterprises, Safety supervision, Supervision mode

#### 1. Introduction

In recent years, by large-scale resource integration and corporate mergers and acquisitions in Henan and Shanxi Province, China's coal exploitation order has been standardized, and the “more, small, scattered, chaotic” situation of coal mining enterprises and the weak security infrastructure were effectively improved [1]. Positive restructuring of small and medium-sized coal mining enterprise and taking the road of nationalization of large-scale coal mines have become an inevitable trend [2]. Safety problems which plagued China's coal industry for a long time have been alleviated, and coal industry that develop healthily and sustainably become a reality..

Facing the new structure after China's coal mine resource integration and corporate mergers, China's coal industry's safety supervision system was also constantly improved. From the changes of the supervision history of the developed countries and China's coal mines, improving the supervision regime was the most core force to protect the safety of structural means [3]. At present, the general idea of safety supervision and management to China's coal production was “national monitoring, local regulating and corporation in charge”. It established a coal mine safety watchdog in vertical management, made a combination with local government departments of production safety supervision and management, and made a combination of state supervision and local regulation [4]. In the context of integration of resources of Shanxi Province, the research on local government safety supervision mode was in order to find an appropriate safety supervision

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system to fix the large group of coal mining.

## 2. Status of coal mine safety supervision system

State Council decided to implement vertical management to coal mine safety supervision system and establish National Coal Mine Safety Supervision Bureau in December, 1999.

In the year 2004, State Council issued Views on Improving the Coal Mine Safety Supervision System (Government Paper No.79, 2004). Responsibilities on coal mine production safety supervision of the local people's governments were defined. National monitoring, local regulating and corporate in charge were implemented in mine safety work.

Coal Mine Safety Supervision Bureau was in charge of coal mine safety supervision and local government' Department of Production Safety Supervision and Management were in charge of safety management. And in some of the major coal-producing areas in China, departments in charge of the coal industry were still in charge of mining safety, Shanxi Province for instance [5].

The relationship between independent state supervision and local safety supervision was that coal mine safety supervision was the basis of safety supervision; coal mine safety supervision organization should inspect and guide coal mine safety management work. Both departments should cooperate, work together.

China's coal national monitoring system was relatively stable, while the local safety supervision systems were different. And after coal resource integration and corporate mergers, all provinces made appropriate adjustments to safety supervision system. According to government paper No.8 (2010) and No.70 (2010) issued by Shanxi in the year 2010, Provincial Coal Industry Bureau was in charge of provincial key coal enterprises' safety supervision, and other coal mines were still in the charge of local government.

However, the government papers No.40, No. 41 and No.42 (2011) issued by Henan Province were different. The supervision work of both provincial key coal enterprises and local coal mine were in the charge of local government by the principle of native supervision.

Coal mine safety supervision mode of Shanxi Province was model A, and that of Henan Province was model B.

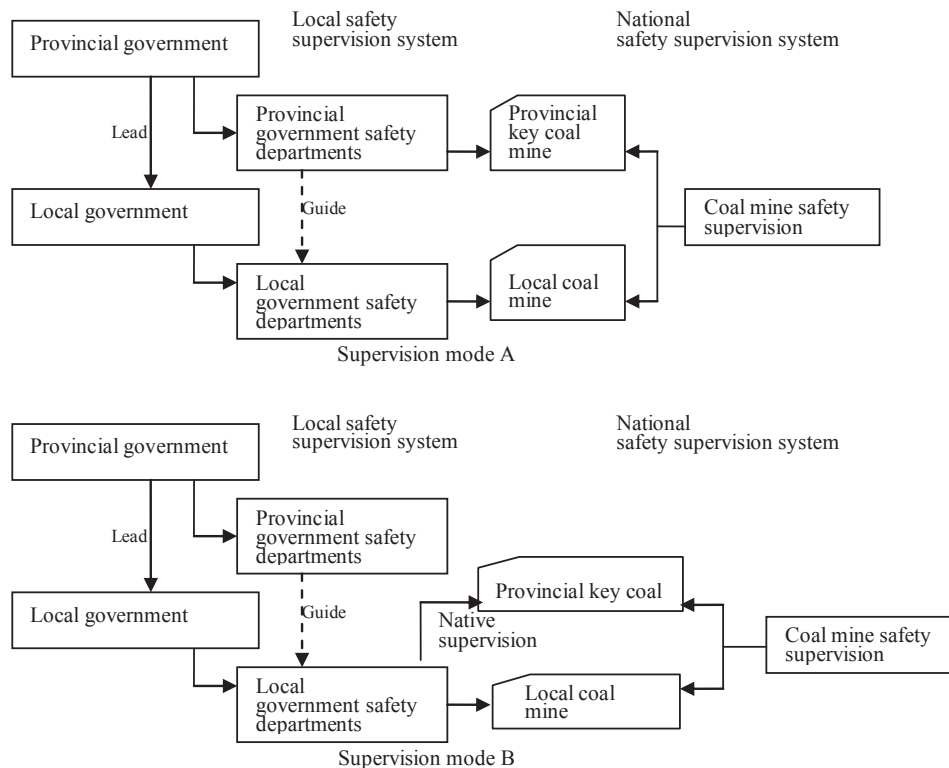


Fig.1. Safety supervision model for coal mine in Shanxi and Henan Province

### 3. Comparative analysis of supervision modes

According to the provisions of the Shanxi provincial government, comparison was made in this paper between the advantage of A and B through 3 aspects including supervision power, regulation and supervision mission.

#### 3.1. analysis of supervision power

According to the provisions of the Shanxi provincial government documents and division of responsibilities of various departments, departments that were directly inspected by province were as follows: Shanxi provincial government safety supervision department, enforcement department of the coal industry bureau and safety supervision department of provincial coal bureau technical supervision department. Otherwise, local government in responsible were as follows: safety department of local coal bureau, coal production safety supervision bureau and safety supervision “five-member team”.

Executive numbers responsible for supervision were in Table 1.

Province direct supervision enforcement departments	Number of people	Native supervision enforcement departments	Number of people (one prefecture-level city)*
Safety supervision departments	5-6	City coal bureau safety division	6
Enforcement department	6	County coal bureau safety division	60
Infrastructure management bureau safety supervision department	10	Coal mine safety production supervision unit	30
Labor and employment center	3-4	"Five-member team"	160
Total	26	Total	256

Table 1 showed that the major executive departments directly supervised by province were safety supervision departments of province bureaus, infrastructure authority of province, and the officers would be 15. However, in the native supervision mode, all the departments are major supervision force. Especially, "Five-member team" of local supervision enforcement authorities would be 160.

#### 3.2. Regulation ways analysis

According to the information from Shanxi Coal Industry Bureau, the major way of province direct supervision was to carry out special inspections regularly. Experts from all enterprises and institutions would be selected for special inspection and checking sub-regional, composing of several expert panels. The contact system [6] between leaders in office and key coal group corporation, business security responsibility system would be established.

This model has 4 advantages. Firstly, there is stronger executive power. China's coal mine monitoring was largely dependent on the executive measure [7]. At a higher administrative level, provincial coal office would ensure safety supervision with a stronger executive measure. Especially for Shanxi Coking Coal Group and Shanxi Coal Transportation Group, provincial government could coordinate comprehensively, and ensure safety regulate effect. Secondly, to the frequent accidents county-level coal enterprises, provincial governments can optimize the environment for the development of the coal enterprises at the county level, to have greater autonomy [8]. Thirdly, experts were widely distributed and highly specialized. Fourthly, some negative phenomena as “human contact” and “eat and ask for something” could be prevented by special safety inspection.

However, this supervision mode had obvious flaws: As the number of ministries was shortage, regulation ways depended on special inspection rather than daily inspection. Outside the special inspection period, supervision power on coal mining enterprises was slightly weak. That is the mishap of direct supervision by province. Safety monitoring should not only focus on monitor on site, but also pay attention to the coal mine construction engineering, coal mine special equipment [9], job occupational hazards all-round monitoring. Due to insufficient number of provincial government departments, it was difficult to ensure that the internal management of the coal mining enterprises was monitored [10]. The article [11] pointed out that effective monitoring was whether the enterprise implementation, thus, supervision on implementation was more effective than safety checks [11].

According to the information from Shanxi Government, the local safety supervision mainly relied on daily inspection by local government and "five-member team" outside regularly safety inspection. "Five-member team" was composed by professional management members from existing human resources of coal mine safety enforcement. Each group was in charge of five coal mines in daily inspection, and the mainly way of inspection was checking on site and taking non-stop tour of daily inspection. The Information showed that there are 11 cities have set 206 "five-member team" and coal mine safety supervision was strengthened.

It also could refer to the native supervision measures in Henan Province, according to the website of Zhengzhou Safety Supervision Bureau, Zhengzhou supervision measures were as follows. Firstly, four sub-leading safety monitoring system and 24-hour attendant supervision were established. Secondly, coal mine safety production supervision and reporting mechanisms cloth 24-hour were established. Thirdly, there were four quarterly safety inspections each year. And the last one was to establish a supervision mechanism for unannounced visits.

It could conclude from native supervision of Shanxi and supervision of Henan, the biggest advantage of native supervision was to ensure the daily supervision of coal mine. However, in the supervision of group business, native supervision has to face the difficulty that supervisors can not bound provincial enterprises because of lower executive level [12], and there would be some negative phenomena as "human contact" and "eat and ask for something" [13].

### 3.3. Control task analysis

After resources integration, Shanxi had 1053 coal mines and planning capacity was around 1.2 billion tones. According to the Shanxi province government documents, Shanxi province coal mine bureau would control 350 in direct supervision, and about 700 would be regulated by local city and county. And the 2 years from now on would be the period of the largest mine construction and investment in history in Shanxi province. There would be 600 coal mines in construction together with new coal projects, and there would output 600,000,000 tons coal per year.

According to data of Shanxi coal information network, coal mine production safety action was carried out by Shanxi coal industry bureau and they were under big pressure. Specific data was in table2.

Table 2 The data of safety enforcements among coal industry administration at all levels in Shanxi Province

Category	Safety enforcements	Staff set out	Coal mining enterprises inspection	Enforcement documents assigned	Misconduct and illegal activities handled
Statistical data	6376cases	37985person-trips	5555numbers	6629copies	257cases
Linfen City data	1368cases	6840person-trips	1368numbers	1368copies	38cases
Proportion	21.46%	18.01%	24.63%	20.64%	14.79%

It was showed in table 2 that the data of one city in Shanxi province accounted for 15% of the data of the whole country which included 11 cities in total. The data indicated that safety enforcements of coal industry administration at all levels in Shanxi Province relied mainly on native supervision. Shanxi Province had 11 cities, 85 counties and 11 county-level cities. The coal industry administrations had been set up in 23 municipal districts. The advantage of personnel, organizations and geography would be made enough use.

Meanwhile, native management had an advantage of geography. Taiyuan as the provincial capital of Shanxi is located in the centre of the province and its supervision assumes radial layout. After resources integration, group companies spread the whole province. If the direct supervision of provincial department was adopted, it would increase difficulty geographically. To take Lu'an group as an example, merger had been carried out in the whole province integrating 101 mines into 34mines with capacity of 31 million tons and reserves of 30 billion tons.

It was roughly estimated that the average distance of mine away from the provincial capital was 160 kilometers and they distributed from south to north. Therefore, the direct supervision of provincial department was not beneficial to supervision.

On the other hand, the topography of Shanxi was complex and there were various geomorphological types such as mountains, hills, plateaus, basins and platforms. The mountains and hills covered two-thirds of the total area. Compared with direct supervision of provincial department, the equipment deployment and supervisors of native supervision were more adaptable to geographical conditions while the difficulties of work were reduced.

## 4. Empirical researches

### 4.1. The supervision to China Poly Group Corporation and coal mining enterprise of Shanxi.

China Poly Group Corporation was a central large enterprise which was administrated by State-owned Asset Supervision and Administration Commission. After reorganization of resources, China Poly Group Corporation had established Shuiyu

coal company, Shayu coal company, Tiexin coal company, Xingchen coal company, Sipurui coal company, Pingshan coal company, Jinzhuang coal company, Yufeng coal company, Hesheng coal company and Changhong new coal company, which were distributed mainly in Lingshi Xian of Jinzhong and Xiangning Xian of Linfen.

Synthesizing the distribution of mine and the rational disposition of supervision mechanisms, the government documents of Shanxi province ruled that native supervision was applied to exert the advantages of daily inspection.

#### *4.2. The transition of supervision to Wangjialing coal mine of Shanxi*

Wangjialing coal mine which was located in Xiangning was a constructed coal mine invested by Huajin Coking Coal Corporation which was a joint venture of China Coal Energy Group Company and Shanxi Coking Coal Group Company. In 2006, Wangjialing coal mine began to be constructed with the annual production capacity of 6,000,000 metric tons. The government documents of Shanxi province ruled that the supervision of the China Coal Energy Group Company was in charge by provincial coal industry administration. In March 28, 2010, the accident of water inrush happened in Wangjialing coal mine. When the accident happened there were 261 workers on site. After the accident 153 workers have been trapped.

State Administration of Work Safety announced that a principal cause of the accident was ineffective examination and treatment of hidden dangers. Especially since March this year, flooding in mine in 2010 coal face has been found many times but effective measures have always been not taken. Finally the annunciation strongly emphasized that supervision over the coal safety should be further strengthened [14].

Some documents indicated that the supervision of Wangjialing coal mine was managed by Shanxi Coal Industry Administration, Shanxi Coal Inspection Bureau, State Administration of Work Safety and State Administration of Coal Mine Safety while authorities of Linfen where Wangjialing was located undertook no supervision. The supervision mode has become a potential threat to safety in production of Wangjialing coal mine. Because the safety duty was not in place, national and provincial authorities had no time to attend and city-county regulators had no jurisdiction, there was a supervision vacuum [15].

In May 2010, government paper No. 70 (2010) announced by Shanxi province claimed the coal mine owned or held by China Coal Energy Group Company was in the charge of city-county regulators in accordance with the principle of native management to exert the advantages of daily superintendency of city-county coal industry administrations.

### **5. Discussion on improvement of supervision mode**

In view of the new ore doing pattern of coal mining enterprises grouping and comparative studies in Section 2, the advantages and disadvantages of the two modes were listed in table 3.

According to table 3, the advantages of direct supervision of provincial department were higher in rank and more powerful while the disadvantages were small number of supervisors and supervision objects distributed widely leading to lack of effective daily supervision. Meanwhile, the advantages of city-county native management were sufficient supervisors and concentrated supervision objects beneficial for daily supervision while the main disadvantages were lower in rank and less powerful so that it was hard to control group enterprises probably.

Based on the above comprehensive analysis, according to the situation of Shanxi Province, an improved mode based on supervision mode B with the advantages of both compensating for the shortages was provided in this paper (see figure 2).

Firstly, supervision mode B took safety regulators of county and city governments as the main body and exerts the advantages of adequate local supervisors acquainted with situations to grantee daily superintendency. Secondly, the association system of safety work between provincial coal administration and key enterprise groups was perfected. The feedback mechanism was established to feedback insolvable problems in native management to provincial coal administration urging to implement. Thirdly, safety inspection of provincial and city-county level was carried on to ensure safety in production. The mode focusing on the native management brings supervision forces of city-county into full play, concentrates and optimizes manpower and expense to ensure daily superintendency of coal mining group enterprises. Through perfecting the association system and the feedback mechanism, higher rank and more power of provincial coal administration were applied to control group enterprises and grantee the effect of the implement. Meanwhile, safety inspection of provincial and city-county level was carried on to ensure safety in production of coal enterprises of Shanxi Province.

### **6. Conclusions**

(1) Based on the annexation and reorganization of resources in Shanxi Province, large grouping coal enterprises played an important role in new pattern of ore doing. It should be kept exploring and practicing to perfect the safety supervision system of coal mine.

(2) In view of large grouping coal enterprises, native management was more scientific and reasonable than direct

supervision of provincial department to make the best use of departments of coal safety supervision of levels and to realize daily superintendency as the main body and safety special inspection as powerful complement.

(3) The feedback mechanism between provincial departments and city-county departments was established to communicate and coordinate which integrated the advantages of the two modes to ensure safety in production of coal enterprises and promote the healthy and sustainable development of coal industry.

Table 3 The comparison of the features of the two supervision modes

	Direct supervision of provincial department	City-county native supervision
Regulator and function	Few enforcement departments, higher in rank, more administrative power and easy to execute	More enforcement departments, lower in rank and hard to control group enterprises probably
Number of supervisors	Small number of supervisors, transferring staff from units	Sufficient supervisors, especially safety supervision departments of cities and five-people group of counties
Safety inspection	Regular safety inspection and expert group from all over the province	Regular safety inspection and expert group from all over the city
Daily superintendency	Inadequate staff and daily superintendency	Mainly on daily superintendency, adequate staff and supervision for 24 hours
Geographic distribution	Supervision objects distributed in all over the province and big manpower and expense	Supervision objects focused on city-county and easy to supervise
Approval procedure	More approval obligation but increasing difficulties in handling and long time spent	Less approval obligation but higher handling rate and better for integrated mine to put into production
Specialists	Widespread source of specialists unacquainted with coal mining enterprises and long time spent	Local specialists acquainted with geological conditions, exploitation and mining area situations of local mine

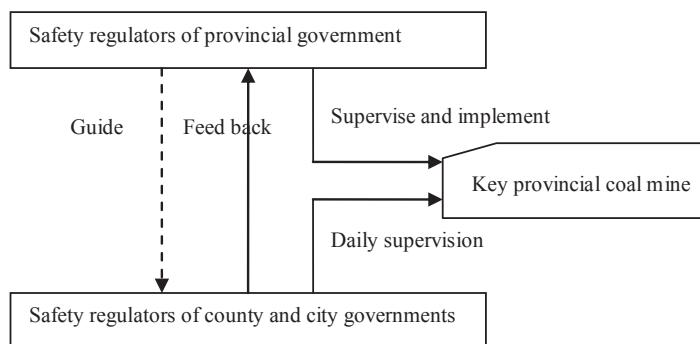


Fig.2. Improved mode of native management

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